Automated biochemical analyzer

# SPOTCHEM™ EZ

## SP-4430 | Operating Manual

arkray,inc.

Chapter 6

# APPENDIX

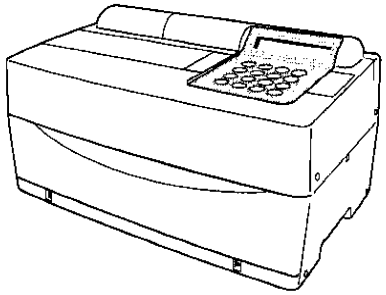
## 6-1 Transmission Specifications


6-1-1 Protocol

6-1-2 Format

6-1-3 Format for measurement result (format 1)

6-1-4 Format for measurement result (format 2)

# 6-1 Transmission Specifications



## 6-1-1 Protocol



| | |
|---|---|
| **Transmission format** | Start-stop system (asynchronous) unidirectional transmission by serial transmission format (in compliance with JIS X5101). |
| **Data format** | One character consists of the following 11 bits.<br>Start bit: 1 bit<br>Data bit: 7 bits (ASCII code)<br>Parity bit: 1 bit (even)<br>Stop bit: 2 bits |
| **Baud rate** | Baud rate can be selected out of the following 6 rates.<br>300, 600, 1200, 2400, 4800, 9600bps |
| **Hand shake** | Suppression by CFT and RTS are possible. (Suppression is not set by default.) XON/XOFF control is not available. |
| **Time gap** | 2-second waiting time is inserted between each block (from < ETX > or < ETB > to < STX >). |
| **Forced finish** | Data transmission is sometimes forced to stop halfway by key operation. It is not promptly stopped by pressing a key, but transmission continues until < ETX > or < ETB > is output. |

# 6-1-2 Format

Block structure is regular. One block consists of start, data and end. This is illustrated below in the following descriptions.


● **Start (S)**

Start of each block is < STX >.

Start of block is expressed as S in the following illustrations.

● **Data**

Data (text) of each block is the main body of transmission contents, and is expressed by arrangement of ASCII characters.

< CR >, < LF >, < RS > or < US > is sometimes involved in data. Characters other than these cannot be involved.

● **End (E)**

End of each block is < RTX > or < ETB >.

< ETX > or < ETB > is distinguished by whether it is in the last block or not.

If it is in the last block, it is < ETX >, and if it is in the middle block, it is <ETB >.

The block end is expressed by E in the following illustrations.

# 6-1-3 Format for measurement results (format 1)

**The measurement result (format 1) is the same as the "regular format" in SP-4410 or SP-4420. The receiving program designed to receive the measurement results of SP-4420 (regular format) can normally receive the measurement results (format 1) of SP-4430.**

## ■ Transmission data of measurement results (format 1)

When transmitting the measurement results with format 1, the number of blocks differs depending on the combination of the reagent strips.

### A. When only Multi Reagent Strips are measured.

| S | Header | Multi Reagent Strip measurement results | E |
|---|---|---|---|

### B. When only Single Reagent Strips are measured.

| S | Header | Single Reagent Strip measurement results | E |
|---|---|---|---|

### C. When Multi and Single Reagent Strips are measured.

| S | Header | Multi Reagent Strip measurement results | E |
|---|---|---|---|

| S | Single Reagent Strip measurement results | E |
|---|---|---|

### ●Format of header

| 001 | 002 | 003 | 004 | 005 | 006 | 007 | 008 | 009 | 010 | 011 | 012 | 013 | 014 | 015 | 016 | 017 | 018 | 019 | 020 | 021 | 022 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ■ | ■ | / | ■ | ■ | / | ■ | ■ | | | | | | ■ | ■ | : | ■ | ■ | | | CR | LF |
| 023 | 024 | 025 | 026 | 027 | 028 | 029 | 030 | 031 | 032 | 033 | 034 | 035 | 036 | 037 | 038 | 039 | 040 | 041 | 042 | 043 | 044 |
| I | D | # | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | CR | LF |

| Start | Finish | Description |
|---|---|---|
| 001 | 001 | Measurement date. Year (The last two digits of year), month (1~12), date (11~31). No zero control. YMD format is always applied regardless of the date setting. |
| 014 | 018 | Measurement date. Time (01~23), Minute (01~59). No zero control. |
| 027 | 036 | When ID is available, ID is output. When there is no ID, only the first 10 digits are output. The measurement number is expressed in 4 digits without zero control. For the measurement number, blank is used for 0311~036. |

## ●Format of Multi Reagent Strip measurement results

| 001 | 002 | 003 | 004 | 005 | 006 | 007 | 008 | 009 | 010 | 011 | 012 | 013 | 014 | 015 | 016 | 017 | 018 | 019 | 020 | 021 | 022 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M | U | L | T | I | : | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | CR | LF |
| 023 | 024 | 025 | 026 | 027 | 028 | 029 | 030 | 031 | 032 | 033 | 034 | 035 | 036 | 037 | 038 | 039 | 040 | 041 | 042 | 043 | 044 |
| ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | CR | LF |
| 045 | 046 | 047 | 048 | 049 | 050 | 051 | 052 | 053 | 054 | 055 | 056 | 057 | 058 | 059 | 060 | 061 | 062 | 063 | 064 | 065 | 066 |
| ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | CR | LF |
| 067 | 068 | 069 | 070 | 071 | 072 | 073 | 074 | 075 | 076 | 077 | 078 | 079 | 080 | 081 | 082 | 083 | 084 | 085 | 086 | 087 | 088 |
| ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | CR | LF |
| 089 | 090 | 091 | 092 | 093 | 094 | 095 | 096 | 097 | 098 | 099 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 |
| ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | CR | LF |
| 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 |
| ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | CR | LF |
| 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154 |
| ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | CR | LF |

| Start | Finish | Description |
|---|---|---|
| 008 | 017 | Name of Multi Reagent Strip |
| 023 | 027 | Item name |
| 029 | 029 | Abnormal mark<br>● Within the range of standard values: Blank (20H)<br>● Low value: <US>(1FH)<br>● High value: <RS>(1EH) |
| 030 | 034 | Measurement value |
| 036 | 041 | Unit symbol |
| 042 | 042 | Temperature<br>● 37℃: Blank(20H)<br>● 30℃: "+"<br>● 25℃: "*"<br>● Items other than enzyme: Blank |
| 045 | 154 | The same repetition as 023~044.<br>When the number of items is less than 6, the redundancy makes up for the blank (20H). |

## ●Format of Single Reagent Strip measurement results

| 001 | 002 | 003 | 004 | 005 | 006 | 007 | 008 | 009 | 010 | 011 | 012 | 013 | 014 | 015 | 016 | 017 | 018 | 019 | 020 | 021 | 022 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | CR | LF |
| 023 | 024 | 025 | 026 | 027 | 028 | 029 | 030 | 031 | 032 | 033 | 034 | 035 | 036 | 037 | 038 | 039 | 040 | 041 | 042 | 043 | 044 |
| ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | CR | LF |
| 045 | 046 | 047 | 048 | 049 | 050 | 051 | 052 | 053 | 054 | 055 | 056 | 057 | 058 | 059 | 060 | 061 | 062 | 063 | 064 | 065 | 066 |
| ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | CR | LF |
| 067 | 068 | 069 | 070 | 071 | 072 | 073 | 074 | 075 | 076 | 077 | 078 | 079 | 080 | 081 | 082 | 083 | 084 | 085 | 086 | 087 | 088 |
| ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | CR | LF |

| Start | Finish | Description |
|---|---|---|
| 001 | 007 | When only Single Reagent Strips are measured: Blank (20H)<br>When Multi Reagent Strips are measured: Fixed character string "SINGLE" |
| 023 | 027 | Item name |
| 029 | 029 | Abnormal mark<br>● Within the range of standard values: Blank (20H)<br>● Low value: <US>(1FH)<br>● High value: <RS>(1EH) |
| 030 | 034 | Measurement value |
| 036 | 041 | Unit symbol |
| 042 | 042 | Temperature<br>● 37℃: Blank(20H)<br>● 30℃: "+"<br>● 25℃: "✻"<br>● Items other than enzyme: Blank |
| 045 | 048 | The same repetition as 023~044. No extra output is made.<br>The block length of this block changes according to the number of Reagent Strips (items). For example, if the number of the Reagent Strips are 2 (2 items), the block length is completed as 66 bytes. |

## ●Data errors

In the Multi Reagent Strip and Single Reagent Strip measurement results, data parts for each item (22 bytes including end CR/LF) are output as follows when measurement errors occur.

### ●Error in range or prozone (OVER)

| 023 | 024 | 025 | 026 | 027 | 028 | 029 | 030 | 031 | 032 | 033 | 034 | 035 | 036 | 037 | 038 | 039 | 040 | 041 | 042 | 043 | 044 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | CR | LF |

| Start | Finish | Description |
|---|---|---|
| 023 | 027 | Item name |
| 029 | 035 | ● Over the range: Fixed character string "OVER >"<br>● Under the range: Fixed character string "UNDER >"<br>● Prozone (OVER): Fixed character string "OVER >" |
| 037 | 041 | ● Over the range: Upper limit of measurement range<br>● Under the range: Lower limit of measurement range<br>● Prozone (OVER): Upper limit of measurement range |
| 042 | 042 | Temperature<br>● 37℃: Blank(20H)<br>● 30℃: "+"<br>● 25℃: "✻"<br>● Items other than enzyme: Blank |

### ●Prozone (CANT' MEAS) or calibration error by magnetic card

| 023 | 024 | 025 | 026 | 027 | 028 | 029 | 030 | 031 | 032 | 033 | 034 | 035 | 036 | 037 | 038 | 039 | 040 | 041 | 042 | 043 | 044 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | CR | LF |

| Start | Finish | Description |
|---|---|---|
| 023 | 027 | Item name |
| 029 | 041 | Error message<br>● Prozone (CANT' MEAS): "CANT' MEAS "<br>● Magnetic card, CAL error, L: "CAL. ERROR L1"<br>● Magnetic card, CAL error, H: "CAL. ERROR H1" |
| 042 | 042 | Temperature<br>● 37℃: Blank(20H)<br>● 30℃: "+"<br>● 25℃: "✻"<br>● Items other than enzyme: Blank |

# 6-1-4 Format of measurement results (format 2)

**The measurement result (format 2) is the same as the "extended format" in SP-4410 or SP-4420. The receiving program designed to receive the measurement results of SP-4420 (extended format) can normally receive the measurement results of SP-4430 (format 2).**

## ■ Transmission data of measurement results (format 2)

### A. When only Multi Reagent Strips are measured.

When transmitting the measurement results with format 2, 1 item is output as 1 block. The order of the items are, Multi Reagent Strip, Single Reagent Strip.

| S | Data in Item 1 | E | S | Data in Item 2 | E | ..... | S | Data in Item n | E |
|---|---|---|---|---|---|---|---|---|---|

※ The end of the block is all block <ETX>.

●Format of "data in item x"

| 001 | 002 | 003 | 004 | 005 | 006 | 007 | 008 | 009 | 010 | 011 | 012 | 013 | 014 | 015 | 016 | 017 | 018 | 019 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | | ■ | ■ | ⁄ | ■ | ■ | | |
| 020 | 021 | 022 | 023 | 024 | 025 | 026 | 027 | 028 | 029 | 030 | 031 | 032 | 033 | 034 | 035 | 036 | 037 | 038 | 039 |
| ■ | ■ | ⁄ | ■ | ■ | ⁄ | ■ | ■ | | ■ | ■ | : | ■ | ■ | | ■ | | ■ | CR | LF |
| 040 | 041 | 042 | 043 | 044 | 045 | 046 | 047 | 048 | 049 | 050 | | | | | | | | | |
| ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | |
| 051 | 052 | 053 | 054 | 055 | 056 | 057 | 058 | 059 | 060 | 061 | 062 | 063 | 064 | 065 | 066 | 067 | 068 | 069 | |
| ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | | |
| 070 | 071 | 072 | 072 | 074 | 075 | 076 | 077 | 078 | 079 | 080 | 081 | 082 | 083 | 084 | 085 | 086 | 087 | 088 | 089 |
| 0 | | | | | | | | | | | | | | | | | | CR | LF |

| Start | Finish | Description |
|---|---|---|
| 001 | 010 | When ID is available, ID is output. When there is no ID, only the first 10 digits are output. The measurement number is expressed in 4 digits without zero control. For the measurement number, blank is used for 031~036 |
| 012 | 012 | Sample number types . For ID, "1". For number , "0" |
| 014 | 015 | The maximum number of items in the measurement |
| 017 | 018 | The order of the maximum number of items |
| 020 | 027 | Measurement date. Year (The last two digits of year), month (1~12), date (1~31)<br>No zero control. YMD format is always applied regardless of the date setting |
| 029 | 033 | Measurement date, Time (0~23), Minute (0~59). No zero control |
| 035 | 035 | Data error.<br>Normal=0, Under the range=1, Over the range or prozone error (OVER)=2, Low value=3, High value=4, Prozone error (CAN'T MEAS)=5, Calibration error by magnetic card L1=6, Calibration error of magnetic card H1=7 |
| 037 | 037 | ● 37℃: " 0 "<br>● 30℃: " 2 "<br>● 25℃: " 1 "<br>● Items other than enzyme: " 0 " |
| 040 | 049 | Name of Multi Reagent Strip (For Single Reagent Strip, blank (20H) is used) |
| 051 | 055 | Item name |
| 057 | 061 | Measurement value.<br>When the data error=1, lower value, the data error=2,5,6,7, upper values are applied |
| 063 | 068 | Unit symbol |